of southern Europe, Asia Minor, Japan, and the central states of the United States. This zone follows approximately the fortieth degree of northern latitude, and indicates an annual average temperature of 12–14°C. Since the Miopliocene, during which the fossil plants of Varennes lived, the most of its components have emigrated toward the south. The plant deposits of Varennes accumulated in a lake, into which the ashes of a volcano fell.—A. C. NOÉ.

Fossil plants from Missoula region.—A paper by JENNINGS[32] deals with some fossil plants from beds which are believed to be of Oligocene age. The fossil plants consist of impressions of leaves and of leafy twigs, there being also some impressions of fruits and leafless twigs. The Missoula specimens are embedded in fine-grained volcanic ash which preserved the finer venation of the leaf surfaces. Twenty-one species are enumerated, ten of which are described as new, and one of which required a new name. Of the fifteen genera represented in the Missoula flora, all but two are also represented in the Florissant Basin of Colorado. The Missoula flora probably occupied the shores and surrounding slopes of a high mountain lake. The climate was warmer, and probably drier than that now prevailing at recent localities of similar geographic position, like, for instance, the Flat Head Valley; and the vegetation represented by the Missoula fossils ranged probably throughout a series of associations from wet meadow to moderately xerophytic oak forests on rocky or sandy shores. All of these vegetational associations were in close proximity to the waters of a lake. There are eleven plates with excellent illustrations in the book.—A. C. NOÉ.

Cycadofilicales.—CARPENTIER[33] presents a most interesting paper on a series of Cycadofilicales fructifications which were from the Lower Carboniferous of northwestern France. Two genera of seeds (*Lagenospermum* and *Carpolithus*) have been observed, and in a number of instances pictured also. Sporangia or microsporangia of *Telangium*, *Pterispermotheca*, and *Diplotheca* are described. CARPENTIER concludes that the small seeds of *Lagenospermum* and of related genera seem to have belonged to *Sphenopteris*, probably *S. Hoeninghansi* and *S. elegans*. While the occurrence of *Sphenopteris* together with seeds of *Lagenospermum* is frequent in the Westphalian of northern France, the seeds of *Neuropterides*, which occur frequently in the Bassin de Valenciennes, are very rare in the Bassin de la Basse-Loire. CARPENTIER also emphasizes that our knowledge of the microsporangia of the Cycadofilicales of Mouzeil and the Bassin de la Basse-Loire is still very rudimentary, only fragments of male inflorescences having been discovered. They seem to have been of a very delicate structure. *Telangium*, or a nearly related genus,

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[32] JENNINGS, O. E., Fossil plants from the beds of volcanic ash near Missoula, Western Montana. Mem. Carnegie Museum **8**:385–427. *pls. 22–23*. 1920.

[33] CARPENTIER, A., Contribution à l'étude des fructifications du Culm de Mouzeil (Loire-inférieure). Rev. Gen. Bot. **32**:337–349. 1920.

originated in the Devonian and flourished in the lower and upper Culm in Basse-Loire and during the Westphalian in the north.—A. C. NOÉ.

Availability of potassium.—BREAZEALE and BRIGGS[34] find that the potassium of orthoclase solutions is not available for wheat seedlings, owing, it is concluded, to the potassium being present with other elements in a complex solute molecule, which does not yield potassium ions. This conclusion is supported by the fact that oxidation with acids makes the potassium available. From the experiments recorded in the paper, the general conclusions are drawn that the concentration of a plant food in the soil solution is not necessarily a measure of its availability for the plant, and that applying finely ground orthoclase to a soil does not immediately increase the available potash content of the soil. While the conclusions are probably justified, it must not be concluded from experiments of this kind that plants cannot get the needed potassium from finely ground orthoclase applied to the soil or from orthoclase found naturally in the soil. The nature of the root system and the conditions of its functioning are probably quite different in the solution than in the soil.—S. V. EATON.

Indian Gondwana plants.—A great majority of the specimens described in this volume were figured by FEISTMANTEL in the *Palaeontologia Indica*. A revision[35] of the material brought to light some new features, and in several instances has revealed inaccuracies in the illustrations accompanying FEISTMANTEL's descriptions. Numerous text illustrations and seven plates in folio with excellent drawings and photographs enable the reader to judge SEWARD's revision of Gondwana plants. SEWARD was ably assisted by SAHNI, who promises to become an authority on Indian paleobotany.

The Gondwana system is an extremely interesting geologic period of high paleobotanic importance. It corresponded to the Permo-Carboniferous of Europe, and is distinguished by paleozoic glaciation features. The Gondwana flora is characterized by a wealth in gymnosperms, especially Cycadophyta. The present volume describes eight species of Bennettitales, and seven species of Nilssoniales; also numerous Cordaitales, Ginkgoales, and Coniferales are represented, but the pteridophytes are rather scarce. No *Glossopteris* is mentioned.—A. C. NOÉ.

New method of vegetative multiplication.—DASTUR and SAXTON[36] have described a method of vegetative multiplication in a perennial species of

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[34] BREAZEALE, J. F., and BRIGGS, L. J., Concentration of potassium in orthoclase solutions not a measure of its availability to wheat seedlings. Jour. Agric. Res. **20**:615–621. 1921.

[35] SEWARD, A. C., and SAHNI, B., Indian Gondwana plants: A revision of Palaeontologia Indica. New Series **7**:1–42. *pls. 1–7*. 1920.

[36] DASTUR, R. H., and SAXTON, W. T., A new method of vegetative multiplication in *Crotalaria burhia*. New Phytol. **20**:228–233. *figs. 4*. 1921.